REMARKS

Claims 1, 2, 4, 19 – 22 and 25 are pending in this application. Claims 1 and 19 have been amended. Claim 25 has been added. The applicant respectfully requests reexamination and reconsideration of the pending claims.

In the June 23, 2009 Final Office Action, the Examiner rejected claims 1, 2 and 19 – 22 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 2,942,668 to Maly ("the Maly reference"). The Examiner rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Maly in view of U.S. Patent No. 3,476,963 to Feldhoff ("the Feldhoff reference"). The applicant respectfully traverses these rejections.

Independent Claim 1, as amended, recites:

> An apparatus for forming a plug in a passageway, the apparatus comprising a carrier which in use is lowered into the passageway, the carrier comprising an elongate body of a material resistant to creep which supports at least two spaced apart portions that are a sliding fit in the passageway such that a gap is formed between each of the portions and the passageway, **a body of material comprising an expanding bismuth alloy the melting point of which is higher than the temperature within the passageway at the point at which the passageway is to be sealed and which expands as it solidifies,** the body of material being supported on the carrier, and means for melting the body of material such that melted material fills a space defined between the first and second portions and the passageway, wherein means are provided to obstruct the gaps formed between the portions and the passageway, the obstructing means being displaced into the gaps as a result of melting of the body of material or as a result of creep of material after it has been melted and solidified.

Please note that claim 25 is similar to claim 1 except that claim 25 utilizes the language "bismuth" rather than "an expanding bismuth alloy". The applicant has made amendments to further clarify the invention. The adding of the language "comprising an expanding bismuth alloy" or "comprising bismuth" or the combination of the two phrases is supported by the last paragraph on page 4 of the application, the fifth paragraph on page 5 of the application, or the first paragraph on page 7 of the present application.

The amendment "the passageway at the point at which the passageway is to be sealed" is supported by the specification at the last paragraph on page 4 and the first four paragraphs on page 5. Support for the amendment "to fill a space defined between the spaced apart portions and the passageway" is set forth in the specification at the fourth paragraph on page 5.

The Examiner states that the Maly reference discloses a body of material with a melting point higher than the temperature within the passageway 15a where the means is provided for melting the material to fill the gap, the melting material expands as it solidifies and that the obstructing means is formed as rings 14 provided in grooves as members. The Examiner further states that the method of using such to plug a pipe where cooling fluid such as water can be provided through the member, and where inherently the thinner material in the gap between the rings and the wall would solidity faster since there is less material to retain heat. *(Office Action, page 2).* The applicant respectfully disagrees with the Examiner.

Specifically, the Maly reference relies expansion of a material upon melting to drive a sealing ring radially outwardly of a chamber containing the expanding material. This is a fundamentally different to the claims of the present invention whereby a particular class of expanding materials (i.e., bismuth or an expanding bismuth alloy), as is recited in independent claims 1, 19 and 26, is employed which expands upon solidification within a space defined between the carrier and the passageway.

In contrast, the seal provided by the Maly reference assembly only occurs at the perimeter of the sealing rings when fully extended. This is different from the apparatus of claims 1 and 25, which is capable of providing a seal along up the full length of the

solidified mass of bismuth or expanding bismuth alloy which extends between the first and second portions (i.e., fins) as well as over the perimeter of the portions. Thus, the improved seal of the apparatus of claims 1 and 25 can provide a much stronger and robust seal than the Maly system.

In the present invention, as recited in independent claims 1, 19 and 25, expansion of the bismuth or expanding bismuth alloy would be less pronounced than that in Maly reference since the bismuth or expanding bismuth alloy expands upon solidifying from the liquid state to the solid state as a consequence of crystallographic changes rather than melting by liquefaction. Specifically, pure bismuth expands in volume by 3.32 % upon solidification and its expanding alloys expand by only about 0.3% in volume upon solidification whereas liquefaction of the types of materials disclosed in the Maly reference can give rise to increases in volume of up to 10% or 20%. (Maly reference, col. 3, lines 23 – 35).

The applicant would also like to bring to the Examiner's attention that not all bismuth alloys expand upon solidification. Only a class of "expanding bismuth alloys" exhibit such characteristic. Expanding bismuth alloys typically comprise more than 50% bismuth by weight. All of the exemplary materials set out in the last paragraph on page 4 of the present application comprise more than 50% bismuth.

Accordingly, the Maly reference does not disclose teach or suggest an apparatus for forming a plug in a passageway including **a body of material comprising bismuth (claim 25) or an expanding bismuth alloy (claim 1) the melting point of which is higher than the temperature within the passageway at the point at which the passageway is to be sealed and which expands as it solidifies.** Instead, the Maly

reference system relies upon expansion arising from liquefaction and makes universally accepted principal that when a material undergoes a solid to liquid transition its volume increases. The Maly reference takes advantage of this well known principle by confining the higher volume within a chamber defined between the carrier and the sealing rings so as to use hydraulic pressure to force the sealing rings radially outward against the well casing. The Maly continuously reference discusses this fundamental principal. For example, the Maly reference discloses that an annular chamber is substantially completely filled with a body of a material which changes from solid to liquid with an increase in volume at a temperature between that of the atmosphere at the earth's surface and that which exists within the well bore at the device is to be employed. Maly, col. 2, lines 23 – 28. The Maly reference further discloses suitable materials at col. 3, lines 2 – 44. The Maly reference discloses that materials of this kind are suitable at least partly because they liquefy at a temperature above that at the atmosphere at the well head but below that which prevails at the point within the well bore where the sealing element is to be actuated. At line 39 of column 3, the Maly reference states that certain alloys of bismuth possess these desired properties, but applicant notes that the qualifier "certain."

The use of the qualifier "certain" clearly shows that the Maly reference appreciated that not all bismuth alloys would exhibit the same properties and thus by implication some bismuth alloys would not exhibit the required property of possessing a melting point above that of the melting point at the well head but below that which prevails at the point at which the well bore should be sealed. Thus, the skilled person, after reading the Maly reference, would appreciate that neither bismuth (claim 25) nor

expanding bismuth alloys (claim 1) of the kind employed or recited in claim 1 and claim 25 would be suitable for the Maly reference apparatus. The applicant notes that the requirement that the meltable material in the Maly system must have a melting point that is between the atmospheric temperature at the earth's surface and the ambient temperature at the point within the well bore where the tool is to be positioned and the well sealed is further elucidated in col. 7, lines 14 – 46. This clearly is different than the claimed invention of claims 1 and 25.

The Examiner stated that the body of material used in the Maly reference has a melting point higher than the temperature within the passageway 15a. The applicants respectfully disagree and believe this is an incorrect interpretation of the Maly reference, which the applicant believes require a body of material with a melting point lower than the temperature within the passageway, as is described above.

Further, the applicants respectfully submit that the Examiner's statement that the melting material expands as it solidifies is not a correct interpretation of the Maly reference, because the melting material employed in the Maly reference would contract as it solidifies. The applicants note that not all bismuth alloys are alike and it would be immediately evident to the skilled person in the art reading the Maly reference that neither bismuth nor an expanding bismuth alloy would be appropriate for use in the Maly system. Thus, it is therefore not reasonable to consider that the bismuth alloy mentioned in the Maly reference would possess the inherent property of expansion upon solidification.

It is important to note that the present invention, as defined in claims 1 and 25, relies upon expansion of the bismuth or expanding bismuth alloy upon solidification, not

just cooling. This is an important distinction. Specifically, the expanding bismuth alloys expand at the point of solidification or freezing and not simply while cooling. As an example, this is likened to the behaviour of water at the point of freezing.

Moreover, it should be appreciated by the Examiner that no specific process is required to cause the material to expand at the point of solidification because it is an inherent property of bismuth and expanding bismuth alloys. The Maly reference does not disclose this feature of bismuth alloys and in fact seems to suggest using certain bismuth alloys purely for their low melting points. Expansion of the materials in the Maly reference arise from their liquefaction drives the sealing rings radially outward against the casing of the well. Thus, the Maly reference relies upon the low melting point of the waxes and certain bismuth alloys employed so that they are in liquid form at the point within the well at which the seal is to be formed. This is fundamentally different to the present invention, as recited in claims 1 and 25, **where the bismuth or expanding bismuth alloy should be at the point of solidification** and therefore maximum expansion to form a tight and effective seal. Accordingly, applicant respectfully submits that claims 1 and 25, as amended, distinguish over the Maly reference.

Claim 2 depends directly on claim 1. Accordingly, applicant respectfully submits that claim 2 distinguishes over the Maly reference for the same reasons as those discussed above in regard to claim 1.

The Feldhoff reference does not make up for the deficiencies of the Maly reference. The Examiner utilized the Feldhoff reference in combination with the Maly reference to reject claim 4. The Examiner utilizes the Feldhoff reference to disclose the

use of rings in grooves of sealing members, where the rings can be either solid with no breaks or can be formed as a C-shaped ring as well. *(Office Action, page 3)*. Assuming, *arguendo*, that the Feldhoff reference discloses all that the Examiner states that it does, the Feldhoff reference does not disclose an apparatus for forming a plug in a passageway, the apparatus including a carrier which in use is lowered into the passageway, the carrier comprising an elongate body of a material resistant to creep which supports at least two spaced apart portions that are a sliding fit in the passageway such that a gap is formed between each of the portions and the passageway, **a body of material comprising bismuth (claim 25) or an expanding bismuth alloy (claim 1) the melting point of which is higher than the temperature within the passageway at the point at which the passageway is to be sealed and which expands as it solidifies.**

Accordingly, applicant respectfully submits that claim 4 distinguishes over the Feldman / Maly combination. Also, the applicant notes that the Feldman reference relates to a multipart casing for an electrical machine in which adjacent parts are urged together by magnetic forces. This is in an entirely different technical field to that of the Maly reference (and the subject invention). It is therefore submitted that a person of ordinary skill in the art would not consult the Feldhoff reference when seeking to address the types of problems to which the present invention relates.

Independent claim 19, as amended, recites similar limitations to claim 1. Accordingly, applicant respectfully submits that claim 19 distinguishes over the Maly reference for similar reasons to those discussed above in regard to claim 1.

Applicant believes that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Please do not hesitate to contact the undersigned attorney if there are any questions in regard to this election. Thank you for your assistance.

An action on the merits is respectfully requested.

Respectfully submitted,

PILLSBURY WINTHROP SHAW PITTMAN LLP

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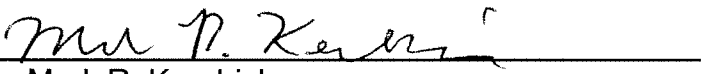
By: 

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